APPENDIX F

Process Piping Report

SUMMARY REPORT
FOR THE
PROCESS PIPING RADIOLOGICAL INVESTIGATION
PRAXAIR BUILDING 14

Prepared for

IDM ENVIRONMENTAL CORP.
SOUTH RIVER, NJ 08882
SUBCONTRACT NO. 14501-129-SC-563

BNI / FUSRAP NY REGION
TONAWANDA, NY

Prepared by

ION TECHNOLOGY, INC.
SARATOGA SPRINGS, NEW YORK

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1.0 SITE AND PROJECT INFORMATION

1.1 Background Information

Building 14 (B14) of the Praxair facility, located in Tonawanda, NY was used for uranium separation processes during the 1940's for the Manhattan Engineering District (MED), the predecessor to the Atomic Energy Commission (AEC). This site is currently under the cognizance of Bechtel National, Inc. (BNI), the Department of Energy (DOE) prime contractor for the Formerly Utilized Sites Remedial Action Program (FUSRAP). IDM Environmental Corp. was contracted by BNI to decontaminate the radioactive contamination (BNI1993) in Building 14 on surfaces and structures to the criteria established in DOE 5400.5.

In prior site activities, contamination was detected within the low pressure air system associated with previous MED operations. This finding prompted an assessment of all process piping in B14 to support the building radiological release program. As part of this survey and decontamination program, process lines throughout B14 were evaluated and characterized for radioactive contamination. This report presents the results of the process piping survey and sampling investigation.

1.2 Historical Information

The Praxair facility was formerly owned and operated by Linde Air Products, formerly a subsidiary of Union Carbide Industrial Gases. From approximately 1943 to 1948, MED contracted Linde Air Products to perform uranium separation operations because of its expertise in producing uranium salts used in the manufacture of various ceramic products. B14 was used primarily for laboratory and pilot plant studies during the operations period. After uranium separation operations ceased, most of the associated systems and components of the operation were removed. Documentation is not available to determine exact locations of uranium processes and the associated process piping. Due to the nature of the operations, temporary systems are believed to have been installed and subsequently removed. Piping originally designed and used for a specific service may have been later modified to accommodate other services, such as changing a low pressure air system into a vacuum system or cross-connecting systems based on needs.

Insulation, most of which is asbestos bearing, has been repaired, removed or replaced with various modifications over the life of the building. The original process piping systems have been modified to support the changing needs of the occupants. The building is now a modern laboratory with typical utilities and service piping systems.

1.3 Scope of Project

The scope of this project was to investigate process piping located within B14 of the Praxair facility. The radiological investigation included sampling and HpGe gamma spectroscopy analysis of process piping debris, and direct contamination measurements of external and internal piping components. Based on the review of the

process piping system history, a site procedure (Attachment 1) was prepared to sample and survey representative process piping. Plan views of the Praxair site and Building 14 are shown as Attachment 2. Work performed for this investigation was performed in accordance with the IDM Site Specific Health & Safety Plan (IDMSHP).

2.0 Process Piping Radiological Investigation Approach

2.1 Survey Methodology

The methodology to obtain representative survey measurements and samples of the process piping began by prioritizing piping into two areas of potential contamination; *Group 1* categorized piping by assigning a high or low potential according to the radiological contamination conditions of the area in which they were installed, and *Group 2*, into high and low contamination potential based on historical information and the type of system (see Tables 2.1 & 2.2). Estimated quantities of each process piping system were generated for all areas in B14 and is presented as Attachment 6.

Table 2.1 Group 1 piping grouped by area contamination.

Higher Contamination Areas	Lower Contamination Areas
Areas 9, 12, 13, 14 North and South	Areas 2, 3, 4, 20A, 8, 10, 11, 15, 1st and 2nd floor offices, large hallway

Table 2.2 Group 2 piping grouped by characteristics and contamination potential.

Higher Potential for Contamination		Lower Potential for Contamination	
System	Comments	System	Comments
High Pressure Steam	Heating process systems, vacuum traps	Nitrogen Gas	Post MED, Pressurized
Low Pressure Steam	Heating process systems, vacuum traps	Natural Gas	Pressurized
Condensate Return	Part of low and high pressure steam lines	Oxygen	Post MED, Pressurized
Ventilation Systems	Overhead contamination indicates prior distribution of airborne contamination	Potable Water	Pressurized, washing effect
		Cooling Water Supply & Return	Pressurized, washing effect
		Hot Water Supply & Return	Pressurized, washing effect
		Electrical Conduit	Accessible for survey

The general survey and sampling procedure was as follows:

- Biased surveys were performed in areas where potential leakage was evident, indicated by discoloration and scale deposits on insulation and external surfaces.

- Process piping system insulation (typically ACM) was removed to investigate the exterior piping under the insulation where exterior insulation was found to be contaminated. All ACM removals were performed in accordance with (12NYCRR56).

- Prior radiation survey data and knowledge of the historical use of the area provided a basis for the location of internal measurements.

- Because of the uncertainty of the installation and removal dates, all ventilation systems were accessed and surveyed both externally and internally for radioactive contamination. Internal surveys were conducted at various points within the ventilation systems for fixed and removable contamination.

- A large area internal smear or sample was performed at each system breech point and the sample analyzed by HpGe gamma spectroscopy to determine isotopic uranium contamination concentrations (pCi or pCi/g).

3.0 Independent Verification Contractor (IVC)

Prior to the B14 process piping investigation, a meeting was held with the IVC (Lockheed Martin) management. The primary responsibility of the IVC is to provide QC verification and certification of B14 areas decontaminated and released by IDM for unrestricted use. The meeting discussed the plan for investigation of B14 process piping systems. All concerns were identified and resolved prior to investigation activities. The following are the primary issues that were agreed upon and completed by IDM and the IVC.

3.1 IDM and IVC agreed to perform inter-comparisons of portable radiation detection instrumentation efficiencies and response between the two agencies. This comparison was completed with acceptable agreement.

3.2 IDM agreed to open and survey each of the four high potential concern process piping types at a minimum of six locations within the building and at a minimum of three locations for each of the low potential concern process piping.

4.0 Radiological Survey Findings and Results

The following is a summary of the radiological surveys performed in support of the B14 process piping investigation. Results of field measurements are presented in Attachment 3. Radiation detection instrumentation utilized by IDM in performance of field surveys is shown in Attachment 5.

4.1 External Surfaces

4.1.1 No removable contamination was detected on any of process piping.

4.1.2 Fixed contamination was detected on electrical conduit and steam piping. All surfaces were decontaminated to less than guideline values.

4.1.3 Asbestos insulation (ACM) was originally contaminated in the Corridor, Large Hall and Areas 2, and 3. The ACM insulation was either decontaminated or removed.

4.1.4 Electrical conduit, steam and natural gas piping in the north end Corridor was originally contaminated with levels of from ≈ 500 to 1000 cpm (32000 to 64000 dpm/100cm2). All surfaces were decontaminated to within guideline values.

4.1.5 Non-insulated nitrogen pipe in the Large Hallway had levels of contamination up to ≈ 500cpm (32000 dpm/100cm2). All surfaces were decontaminated to within guideline values.

4.1.6 An external natural gas line in Area 14 SW was originally contaminated with levels of ≈ 300 to 1200cpm (19000 to 77000 dpm/100cm2). Decontamination is scheduled for that line as of this time.

4.1.7 A remnant process pipe located in the overhead of Area 3 and 4 was originally contaminated up to ≈ 400cpm (26000 dpm/100cm2) has been decontaminated to within guideline values.

4.1.8 Contaminated ACM insulation on steam piping (500cpm) was removed in Area 2.

4.1.9 Electrical conduit lines within various areas of B14 contaminated up to ≈1200cpm (77000 dpm/100cm2) were decontaminated to within guideline values.

4.1.10 A water heater in Area 15 was found to be contaminated up to a maximum of 1000cpm (64000 dpm/100cm2). The unit was decontaminated to within guideline values.

4.2 Internal Surfaces

Approximately 145 samples of piping internals were analyzed by low level gamma spectroscopy. All process pipe internal samples analyzed by low level gamma spectroscopy were evaluated for total Uranium activity concentration in pCi/g (for samples of residual dust or debris) or expressed as equivalent dpm/100cm2 for wipes of internal surfaces. The results of HpGe gamma spectroscopy analysis are presented in Attachment 4.

4.2.1 One internal debris/dust sample of a space heater intake plenum located in the overhead of Area 12 was determined at 88 pCi/g; the remaining surface

debris and dust was removed from the system.

4.2.2 The Corridor ventilation space heater was contaminated to a maximum of 500,000 dpm/100cm2. The space heater was removed and packaged for disposal.

5.0 Summary

During calendar year 1997, the process piping and ventilation systems within Praxair B14 were radiologically characterized by performance of surveys, samples and historical records review. Process piping and ventilation systems identified as being radiologically contaminated were then decontaminated or removed and packaged for disposal.

Final survey data demonstrate with a high degree of confidence (at the 95% confidence level) that no significant radioactivity attributable to the MED uranium processing operations remains on or within the investigated process pipe or ventilation systems of B14.

The final radiological status of the B14 process pipe and ventilation systems are such that overall residual activity from uranium operations is significantly less than the guideline values, does not pose a health and safety hazard to operating personnel, and the process piping and ventilation systems meet all requirements for release for unconditional use.

6.0 References

(IDM97) IDM Process Piping Investigation Procedure, dated 4/16/97.

(IDMSHP) IDM Site Specific Health & Safety Plan, Rev 1.7, dated 9/4/97.

(12NYCRR56) Asbestos Removal NY Code Rule 56

(BNI1993) Remedial Investigation (RI) Report.

B14 Process Piping Investigation

Attachment 1

Process Piping Investigation Procedure

Building 14 / Praxair
Process Piping Radiological Investigation

Date : April 16, 1997
Task Order # : 129-SC-563-023
Prepared : Mark Cafouras / Peter Biesiadecki

Purpose: IDM Radiological Investigation and Clearance of Building 14 Process Piping with the Independent Verification Contractor (IVC) concurrence to release from any future radiological concerns

References: *Prudent Practices for Handling Hazardous Chemicals in Laboratories*
IDM Procedure – Line Purge and Line Break Safety Procedure
IDM Lockout / Tagout Procedure
Applicable MSDS sheets for the appropriate process line gases
Praxair Hazardous Work Permit / Notification
IDM asbestos removal procedure
Code Rule 56: Requirements for Asbestos Sampling & Removal

Preliminary: IDM Management Safety consultation and review
Praxair approval for line valve isolations with field verification for lockout/tagout
IDM Site Safety review of IDM Task Hazard Analysis (THA) with site personnel
Radiation Work Permit preparation and safety review with workforce
Pre-job Briefing

Work Plan / Procedure for Process Piping Investigation

1.0 Introduction
The purpose of this procedure is to purge, survey, and sample the process piping in Bld 14 for radiological contamination both externally and internally for release to the Independent Verification Contractor from any radiological concerns.

2.0 BNI / Praxair Site Safety have been briefed and concurred on intended operations to isolate and survey the process piping. In each new area, IDM will communicate and brief BNI / Praxair on intended operations to coordinate safety / work operations with the Building 14 tenants. IDM will post the area to limit site personnel access during process survey operations. Praxair will generate and post their own Hazardous Work Permit to inform their personnel of intended operations.

3.0 Praxair will identify and sign-off the appropriate process system isolation valves to allow IDM to isolate the affected process system. IDM will maintain Positive control with Praxair concurrence by tagging the appropriate valves shut and the removal of the affected system operating hand-wheels during the process piping investigation.

4.0 IDM will generate a Task Hazard Analysis and Radiation Work Permit to identify various

process piping hazards including chemical and radiological concerns. A review with appropriate work personnel will be communicated with signoff at the pre-job briefing prior to the commencement of work. The affected area will be posted to limit access to appropriate personnel. Scaffolding and/or the Genie Lift will be built, inspected, and used to access the appropriate breech / vent points.

5.0 Process Piping is divided into 2 categories -High Potential and Low Potential from a radiological concern.

High Potential Lines include:
1. Low pressure air
2. High pressure steam
3. Low pressure steam
4. Steam Condensate

Low Potential Lines include:
5. Natural gas
6. Oxygen
7. Hot & Cold water
8. Nitrogen gas-various pressures

Additionally, Bld 14 'Areas' are divided into "High Profile" areas which include: "Areas" 12, 13, 14N, 14S, and Area 9 with others identified "Low Profile" areas unless otherwise identified.

Depending on accessibility, IDM's goal is 6 *internal* access survey points for Hi-potential process lines and 3 access points for Low-potential process lines in Building 14. Externally, all insulated process piping will be radiologically surveyed. When applicable, a certain percentage of insulated asbestos process piping insulation will be removed and externally surveyed at probable unions, drains, strainers to verify process system leaks and insure radiologically no contamination exists under the insulation following all applicable asbestos regulations. Furthermore, HVAC systems will be tagged, inspected and surveyed as required.

General Safety Precautions will include but not limited to the following for each area entered:

- After the Work Area Foreman has identified, tagged, and traced the appropriate process line to be breached & investigated, he is the *only* individual authorized to direct which valves / unions are to be opened and closed during the evolution.
- All personnel involved will know where appropriate emergency equipment (i.e. fire extinguishers), alarms, and appropriate emergency phone # etc. are located within each new work area entered.
- No smoking, open flames, sources of heat, or spark producing equipment will be allowed or operated during the following process line venting or re-assembly, notably natural gas and oxygen. Grounding straps will be used during venting operations to eliminate static- produced sparks. Personnel should ground tools to adjacent non-flammable metal piping prior to starting hazardous work. Soapy water & explosimeters are the preferred method for leak checking various unions / valves

during re-assembly.

- No oil or grease will be used on *any* process piping (i.e. oxygen) or oxygen tanks. This will include the use of new work gloves during disassembly and re-assembly by the workforce. Care will be exercised never to interchange oxygen valves, regulators, etc with any other intended use.
- Oxygen and Natural gas process lines will never be vented sequentially but preferably on different days.
- Extreme caution will be exercised when breaching steam systems due to burns and the prevalence of isolation valve leak-bye.
- The Radiation Work Permit will identify dressout requirements which may be changed by Site Safety based on the various chemical safety considerations of the process systems.

6.0 PROCESS PIPING PROCEDURE:

6.0.1 The internal radiological survey of Process piping in Bld 14 will require isolation and evacuation for access. Process piping with hazardous constituents (i.e. natural gas, oxygen, & nitrogen) will require venting and purging with inert nitrogen gas (or low pressure air as applicable for nitrogen) to an elevated area outside the exterior of the building (away from any personnel, air intakes into the bld, or sources of ignition) prior to breaching. After the Praxair authorized person has authorized and field verified the process line isolation valves to be shut, IDM will hang the approved tags on the process lines to be isolated and verify tagged shut isolation valves with the removal of the operating handle to maintain positive control.

6.0.2 IDM will start with non-hazardous process lines (hot/cold water & low pressure air) followed by steam and condensate as applicable to familiarize the work crews with the operations and safety procedures.

6.0.3 IDM will verify initial hazardous (natural gas, oxygen, & nitrogen) process piping conditions at the unions / valves with the explosimeter to ensure a non-hazardous conditions exists prior to start of work. A pressure test will be performed on the appropriate system via the system piping down-comers and a 2 stage gauged nitrogen gas cylinder (mounted and chained in a mobile cart) to test the integrity of the tagged isolation valves / system for leakage.

6.0.4 If successful, the appropriate process piping lines will be isolated and purged to remove their hazardous characteristics. All special safety precautions for Natural Gas, Oxygen, and Nitrogen will be followed during the procedure. Areas will be posted to eliminate flammability hazards, smoking, sparks, oxygen deficiency during all gas venting operations.

6.0.5 The systems (natural gas, oxygen, nitrogen) will be evacuated first slowly by natural venting, followed with purging (@ 5-10 psig > system pressure with nitrogen or compressed air as applicable) approximately 2 calculated volumes of gas to the outside atmosphere via a rubber air hose connected to an available system down-comer. The rubber vent hose will be grounded to earth ground. Two

combination LEL / Oxygen meters will be used for this purging- one in the area where personnel are working inside the building and the other monitoring the vented gas to the outside to verify when the process piping is fully evacuated and vented. Other low points and down-comers will also be required to be sequentially vented, to ensure removal of all hazardous constituents in the same manner. Other process piping lines (i.e. cold & hot water, steam) will be isolated, vented, and drained to Bld-14 drains prior to breech.

6.0.4 After the affected process line has been completed evacuated and verified by IDM site safety, the process line will be breached at available applicable access points including unions, strainers, and pipe caps with IDM site safety continuously monitoring for any hazardous conditions. RadCon will perform the internal survey / sampling of the internal breached areas. After completion of the radiological survey, the system will be reassembled and closed in preparation for returning to service.

6.0.5 A final pressure test will be performed before opening applicable isolation valves with bottled gas to verify system integrity and tested with soapy water at the breached sampling points. The oxygen lines will be purged and vented with bottled oxygen while the low pressure air will be tested and replaced with compressed air. The natural gas lines will not need to be purged. If successful and after authorization to remove the tagged isolation valves, the work area foreman will return the system to service.

Prepared By: Mark Cafouras Date: 5/19/97
Ion Technology, Inc
Peter Biesiadecki
IDM Environmental, Inc

Reviewed / Approved By:

Charles W. Avery Date: 5/19/97
IDM Site Superintendent

Joe Dinardo Date 5/19/97
IDM H & S Representative

IDM ENVIRONMENTAL
PRAXAIR / BUILDING 14
Process Piping Isolation Piping / System Authorization
LOCKOUT / TAGOUT LOGSHEET

DM Tag #	Date	System	Area	Valve / Breaker Safety Tag Description	Praxair Valve Authorization-Approval	Date SafetyTag Installed	Person Installing Tag	Valve Handle Removed	Date Return To Service	Initial

B14 Process Piping Investigation

Attachment 2

Plan View

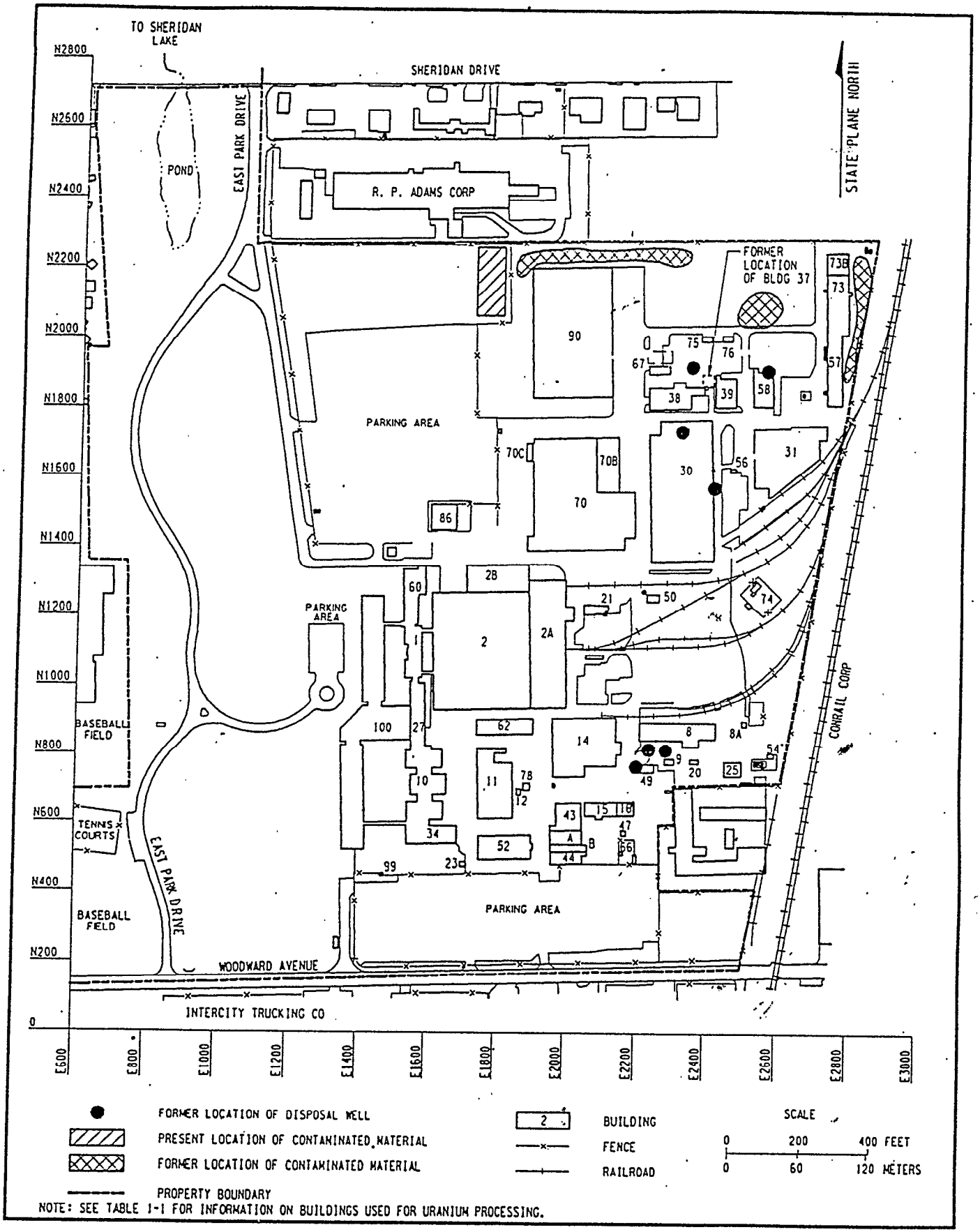

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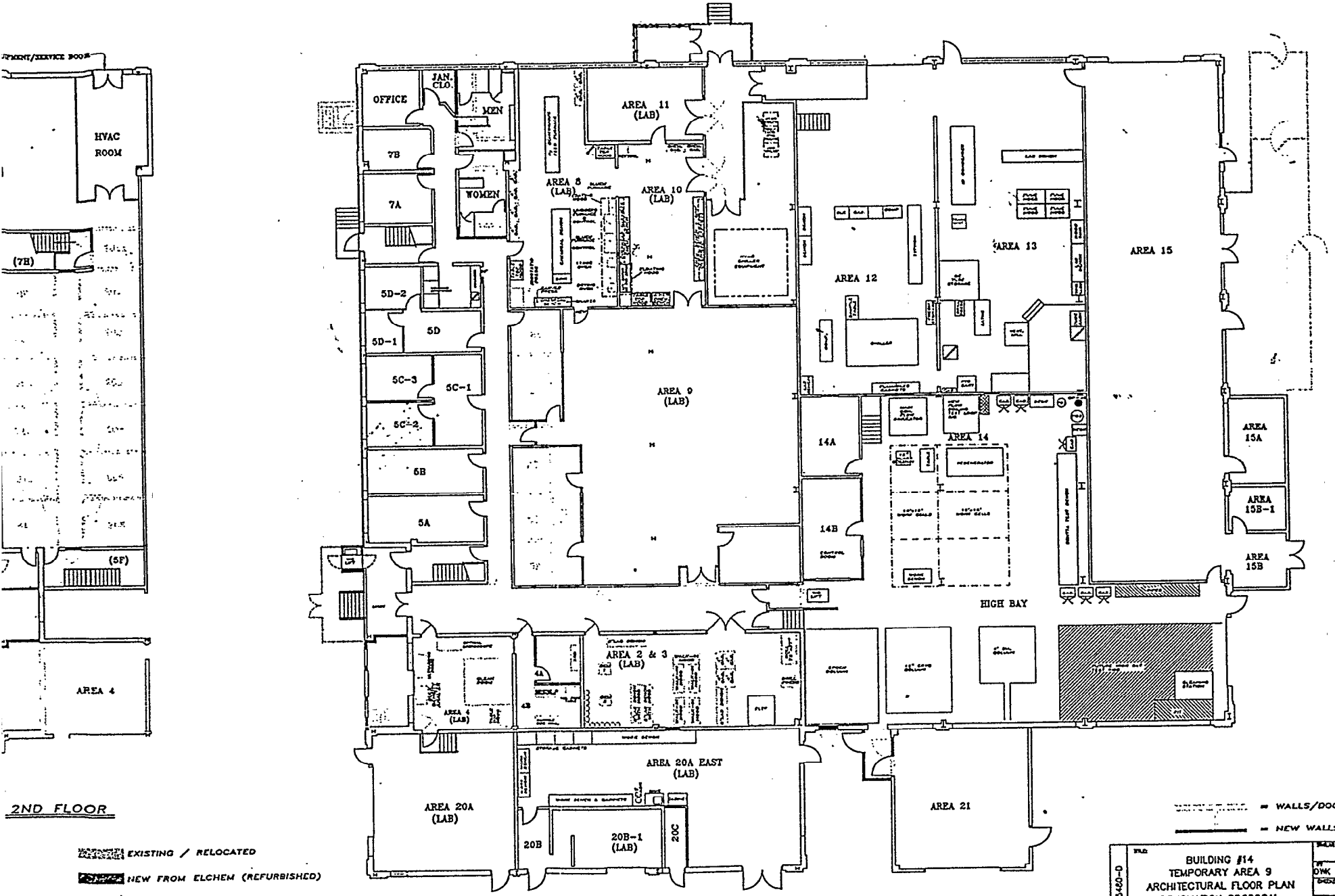
Figure 1-5
Plan View of Linde



2ND FLOOR

1ST FLOOR

EXISTING / RELOCATED

NEW FROM ELCHEM (REFURBISHED)

NEW PURCHASE

= WALLS/DOORS REMOVED

= NEW WALLS

APP'D	LETT.	ALTERATION	DATE	BY	CK'D	APP'D	LETT.	ALTERATION	DATE	BY	CK'D	APP'D	LETT.	ALTERATION	DATE	BY	CK'D	APP'D

B1AV-5480-D

BUILDING #14
TEMPORARY AREA 9
ARCHITECTURAL FLOOR PLAN
RENOVATION PROPOSAL

PRAXAIR

DWK	2/97	NONE
CHECKED		
APPROVED		3
APPROVED		1

F-5480-D